CLAIMS

We claim:

1. A method for forming a mask, which comprises:
   providing a photosensitive material;
   performing at least one pass to write a pattern onto the photosensitive material; and
   developing the photosensitive material.

2. The method of claim 1, further comprising etching the photosensitive material.

3. The method of claim 1, wherein the photosensitive material is a photoresist, an e-beam resist, a HEBS glass, an emulsion or a black resist.

4. The method of claim 1, wherein there are about 2-8 passes.

5. The method of claim 1, whrein each pass is offset such that no two passes write along the same path.

6. The method of claim 1, wherein the at least one pass is performed using a laser, uv, electron beam, infrared, visible or x-ray source.

7. The method of claim 1, wherein stitching error and exposure non-uniformity is reduced.

8. A method of lithographic processing for the formation of a microstructure, which comprises:
   providing a substrate;
   applying a photosensitive material over the substrate;
   performing at least one pass to write a pattern of a specific structure onto the photosensitive material, whereby stitching error and exposure non-uniformity is reduced;

melting at least a portion of the photosensitive material, whereby general roughness error is reduced;

developing the photosensitive material; and

removing remaining photosensitive material.

9. The method of claim 8, further comprising:

etching the photosensitive material to transfer the microstructure onto the substrate.

10. The method of claim 8, wherein the at least one pass is performed using a mask.

11. The method of claim 10, wherein the mask has been formed using a plurality of passes.

12. The method of claim 8, wherein the step of melting comprises a step of heating the photosensitive material at a temperature for a period of time.

13. The method of claim 12, wherein the temperature is about 80-170°C and the time is up to about 1 hour.

14. The method of claim 12, wherein the temperature is about 60-90°C and the time is greater to or equal to about 30 minutes.

15. The method of claim 8, wherein the step of melting comprises placing the photosensitive material upside down near a heat source.

16. The method of claim 14, wherein the heat source comprises a hot plate.

17. The method of claim 8, wherein the step of melting comprises flowing a hot fluid or solvent vapor across the surface of the photosensitive material.

18. The method of claim 8, wherein the method further comprises:
performing gray scale lithography.

19. The method of claim 17, wherein the gray scale lithography process is half tone process.

20. The method of claim 18, wherein the gray scale lithography process is a modulated exposure masking process.

21. The method of claim 8, wherein there are about 2-8 passes.

22. The method of claim 8, wherein each pass is offset such that no two passes write along a same path.

23. A mask, the mask being formed by a process comprising:
providing a photosensitive material;
performing at least one pass to write a pattern onto the photosensitive material; and
developing the photosensitive material.

24. The mask of claim 23, wherein the photosensitive material is a photoresist.

25. The mask of claim 23, wherein there are about 2-8 passes.

26. The mask of claim 23, whrein each pass is offset such that no two passes write along the same path.

27. The mask of claim 23, wherein the process further comprises etching the photosensitive material.

28. The mask of claim 23, wherein stitching error and exposure non-uniformity is reduced.

29. A microstructure, the microstructure being formed by a process comprising:

providing a substrate;

applying a photosensitive material over the substrate;

performing at least one pass to write a pattern of a specific structure onto the photosensitive material, whereby stitching error and exposure non-uniformity is reduced;

melting at least a portion of the photosensitive material, whereby general roughness error is reduced;

developing the photosensitive material; and

removing remaining photosensitive material.

30. The microstructure of claim 29, wherein the at least one pass is performed using a mask.

31. The microstructure of claim 29, wherein the step of melting comprises a step of heating the photosensitive material at a temperature for a period of time.

32. The microstructure of claim 31, wherein the temperature is about 80-170°C and the time is up to about 1 hour.

33. The microstructure of claim 29, wherein the temperature is about 60-90°C and the time is greater to or equal to about 30 minutes.

34. The microstructure material of claim 29, wherein the photosensitive material is a photoresist.

35. The microstructure of claim 29, wherein the microstructure is a turbine rotor, a micro-lens, a microfluidic device, a microrelay, an optical attenuator, an optical shutter, a photonic switch, an accelerometer or a gyroscope.